

STAT 110: Practice Problem 11 Solutions

Fall 2017

1. Myopia, or near-sightedness, typically develops during childhood years. Some studies have explored whether there is an association between development of myopia and the use of nightlights with infants. One study (Quinn, et al., 1999) interviewed parents of 479 children who were seen as outpatients in a university pediatric ophthalmology clinic. One of the questions asked whether the child typically slept with light in the room or in darkness before age 2. Based on the child's most recent eye examination, the children were also separated into two groups: near-sighted or not near-sighted. **The researchers hypothesize that sleeping with the room light on might cause near-sightedness.**

a. What is the explanatory variable of interest?

Amount of light in the room

b. What is the response variable of interest?

Whether the child is near-sighted

c. The data from this study are shown in the following table.

	Darkness	Light in Room	Total
Near-sighted	18	119	137
Not near-sighted	154	188	342
Total	172	307	479

Calculate the relevant proportions that will help the researchers investigate their hypothesis.

$$\hat{\pi}_{\text{nearsighted} \mid \text{darkness}} = 18 / 172 = 0.105$$

$$\hat{\pi}_{\text{nearsighted} \mid \text{room light}} = 119 / 307 = 0.388$$

d. Does there seem to be an association between whether a child is nearsighted and whether light is used in the child's room at night before the age of 2? Explain.

Yes. The chance of being near-sighted is greater for those children who slept in a room with light. (Fisher's exact p-value < .0001).

e. Does this study provide convincing evidence that the room light is *causing* the children to develop near-sightedness? Explain why or why not. *Hint: Think about potential confounding variables and how this data was collected (i.e., is this an observational study or a designed experiment?).*

No. This is an observational study, as subjects weren't randomly assigned to either of

the light conditions. It is possible that this association exists because near-sighted parents (who are more likely to have near-sighted children) choose to have light on in their child's room to make it easier to see themselves. Or, it could be that the near-sighted children have difficulty seeing, which makes them more likely to request a light in the room at night.